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# Needs of Low-income Residents in Flood-Prone Area to Mitigate Their Flood Loss through Microinsurance

A case study of Tambon Phu-Kao-Thong, Ayutthaya province, Thailand

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Disaster of the past decade reminded that Ayutthaya province of Thailand has been commonly facing with flood every year. The study focuses on how to enable low-income residents to mitigate their financial risk in flood loss through neighborhood microinsurance. The results revealed that low-income residents have been suffering on diminished income and damaged house. It causes them lack of financial liquidity and forces them borrow money from moneylenders. Microinsurance is one of financial disaster instruments for protecting low-income residents against flood losses. As results, respondents are willing to join in microinsurance program, as long as it is combined with microfinance. Meanwhile, enhancing neighborhood relationships are the fundamental way to achieve the ultimate goals of the study.

**Key Words :** *neighborhood microinsurance, financial liquidity, financial disaster instruments*

## 1. Introduction

While a number of countries are focusing on economic development, the world is facing with natural disaster. As climate changing, all countries of the world are facing with natural disasters, which more severe in term of frequency increasing and severity level than the past of decade<sup>1)</sup>. In 2008, 1.5 millions of Thai residents (2.5 percent of total population) were victims of flood. Picture on the right hand showed that nearly 40 % of land area are flood risk area, especially in northeast where 20 percent of families were low-income families.

As a point of flood loss, low-income residents in flood prone area have to handle with financial risk because of flood losses. Financial options of low-income families are usually narrower and more climate-sensitive than another social class. Increasing attention in disaster risk management in term of finance is nowadays paid to microinsurance as risk transfer mechanisms for low-income families. It can play in indemnitor role for compensating loss, assisting restoration activities, and improving families' risk bearing. The study focuses on answering the questions what low-income residents needs to mitigate their flood loss through flood microinsurance and focuses on identifying the crucial factors influencing on decision making of the low-income residents to join in neighborhood flood microinsurance policy. The expected outcome of the study is to enable low-income residents to participate in neighborhood flood microinsurance.

The daily life of many Thais is a permanent emergency as flood is the common hazard occurring every year. Flood can be interpreted as the extreme situation when compare with everyday condition, which it make residents in flooded area suffer in both diminished mental health and physical loss on their property. Disaster makes evident that the low-income residents are vulnerable because they are lack of financial capacity to handle with any cost of risks especially unexpected risk<sup>2)</sup>. In Peru, the statistical data of dropped consumption phenomenon caused by disaster during 2000 to 2005 revealed that first quarter of poorest group dropped their consumption by 3.8 percent, while the least poor group in the top quarter had consumption dropped only 1.2 percent<sup>3)</sup>. Seemingly, disaster does not only impact on vulnerable residents during it is occurring, but also disaster victims had been suffering from financial loss after disaster occurred.

The scholars mentioned that risk financing approaches and its instruments can be the tool to resolve this problem. It can be categorized into four approaches of financial risk management, which are non-market risk sharing, market risk transfer, inter-temporal risk spreading and finance self-supporting as illustrated in Table 1. The study focuses on market risk transfer and finance self-supporting. An insurance approach based on market risk transfer is related actions consist with three main means; responding to the adverse effects of

climate change, alongside financial funding and technology transfer weather-related disaster<sup>4)</sup>. It can enhance financial flexibility to flood shocks and provide an opportunity to spread and transfer risk, which can provide incentives for risk reduction and prevention to private sector take response action<sup>5)</sup>. Meanwhile, a number of scholars stated that the “finance trinity as savings, credit, and insurance” could become an alternative option for finance self-supporting<sup>6)</sup>.

## 2. Role of Microinsurance for Assisting Financial liquidity in Flood Loss

Based on the theoretical concept of disaster risk, individual disaster risk is assessed by a function of relation between the hazard times vulnerability divided by their capability. Disaster risk financing approaches is subject to develop financial instruments for enhancing financial capability, which can increase disaster risk bearing.

Traditionally, a number of risk financing instruments are available for assisting disaster victims to have better financial liquidity. The risk financing instruments can be categorized into four categories as shown in Table 1. The first, non-market risk sharing is defined as risk is transferred among victims and non-victims over market agreements of trading risk which means non-victims obtain disaster risk without a return statement. For example, government is obligated to play in a role of disaster relief provider for helping disaster victims after a disaster occurred<sup>7)</sup>. The second is market risk transfer, which can be defined as risk of clients transferred among clients based on market condition. The example of market risk transferring instrument are disaster insurance and reinsurance, microinsurance service and catastrophe bond. The third, inter-temporal risk spreading is financial services requesting clients to make saving account with the institution. In practice, the term is pointed more narrowly like micro-credit and micro-saving that identify themselves as “microfinance institutions” (MFIs)<sup>9)</sup>. The fourth focuses on Finance Self-Supporting classified into six financial options such as reducing household consumption, drawing upon savings either in the form of cash or non-cash assets, and borrowing money from moneylenders<sup>8)</sup>.

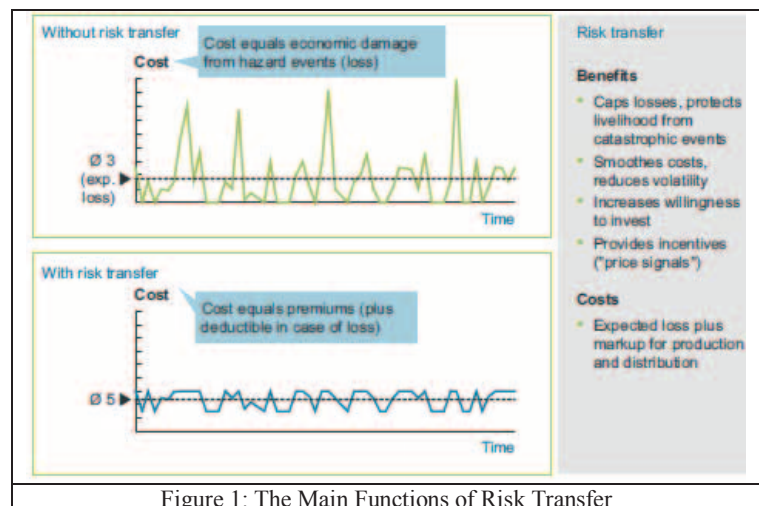
In short, each of disaster risk financing approaches has strengths and weakness. Only one instrument cannot make cost efficiency and contribute productivity. Non-market risk sharing as disaster relief is unsustainable approaches for solving the diversity of economical impacts in long-term planning. Because it directly push burden from affected residents to another supporter such as donor and government, which means tax will be paid for helping affected residents from disaster, instead of using for another development project.

On the other hand, a number of case studies related to microfinance institution (MIFs) have been shown inability to meeting with their post-disaster services and mechanisms requested by their clients. Seemingly, financial self-supporting and market risk transfer defined as microinsurance tend to be sustainable financial approaches for disaster risk management in long-term planning.

**Table 1: Risk Financing Approaches and Its Instruments**

Approaches	Examples of instruments
1. Non-market risk sharing	Disaster relief provided by government, NGO and donors
2. Market risk transfer	Insurance and reinsurance, Micro-insurance and Catastrophe bond
3. Inter-temporal risk spreading	Contingent credit (financial market instrument), Reserve fund, and Microfinance both Microcredit and Micro-savings
4. Finance Self-Supporting	Six financial options facing low-income households in a crisis - Reducing household consumption - Making distress sales of physical assets, including livestock - Sending family members to search for work in less-affected areas - Withdrawing upon their savings - Borrowing money - Using remittances

Source: Adapted from Hochrainer and colleague (2007), Parker and Nagarajan (2000)



**Figure 1: The Main Functions of Risk Transfer**

Source: Economics of Climate Adaptation Working Group (2010)

As a viewpoint of disaster scholars, flood microinsurance is a unique type of insurance with affordable premium based on between the concepts of risk transfer and risk pool among clients by offering insurance policy. It primarily aims to insure the low-income residents, especially those in the informal sector, who tends to be underserved by commercial bank and social insurance schemes. OECD states the benefits of insurance that insurance has a dual role with respect to mitigation measure. Access to insurance payouts can decrease the net adverse impact of climatic events on policyholders. At the same time, insurance is also an instrument for convincing residents to take mitigation measures aimed at reducing climate risks<sup>9)</sup>.

Figure 1 illustrates the benefit and costs of risk transfer. Risk transfer can smooth the costs of climate events to individuals by trading off premiums<sup>10)</sup>. In disaster risk transfer market approach, households have to pay in the equal amount of money as premium price for house restoration cost whether actual losses in some period may although be lower than premium. But in the severe disaster, households are ensured that insurer will compensate their losses although it will be over the amount of paid premium. As premium price is charged by expected loss plus a deductible cost for risk distribution. Pool premiums are used to compensate client losses in cycle of limiting cross-subsidies between policyholders. According to premium design, group and individual insurance patterns of insurance scheme are one factor influencing on premium price. Neighborhood flood microinsurance can keep administrative cost lower than individual insurance scheme, as distributed transaction pattern is group-by-group damage assessment rather than one case-by-case. Moreover, this scheme can reduce the potential of only high-risk person purchasing the insurance by requiring of group membership qualification. The greatest of group-membership qualification is that it tends to get membership faster than individual insurance. In the large-scale viewpoint, it will be benefit to increase likelihood to create community based disaster prevention and mitigation programs supporting finance by micro-insurance program. However, willingness to join in group insurance scheme is relied on strong relationship among group members.

### 3. Research Methodology

The study methodology is designed based on qualitative analysis using observation technique and in-depth interview technique with sample fraction of the population in Tambon Phukaothong. A study area, Tambon Phukaothong, is selected as it is the most vulnerable area in to be flood caused by location located near flood detention area. While surrounding area is protected by water detention project. In term of sampling design, surveys sampling design is based on stratified random sampling method. Two attributes for categorization respondents are respondent's characters of house construction and household income classified by income poverty line and average of household income as shown in Figure 3. Considering with two attributes, pillar house construction can protect owner from 1.5 meters of average flood water level, while non-pillar house owners will suffer from flood in every water level of flood. On the contrary, household income will be mainly factor dominating in choosing the type of financial options in an emergency. As surveys, a total number of respondents are twelve households as illustrated in Table 2.

In the study area, there are not much different household characteristics between the resident themselves, because most of them are both relative and neighbors. Most of Thais in rural area divide inherited big land lot into small piece of land for sharing land among their relatives. Therefore, the twelve respondents living far from each others can completely express almost household characteristics of the study area.

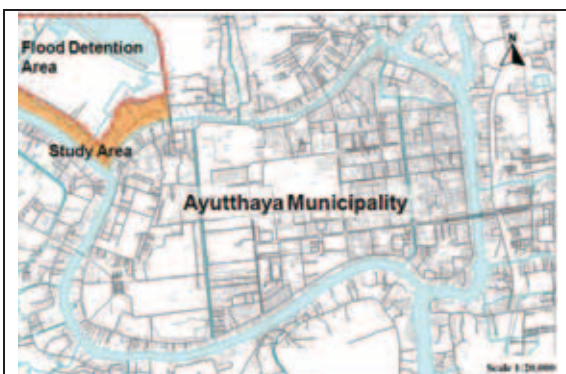


Figure 2: study area located near flood detention area

Source: Department of Public Works and Town & Country Planning, Kingdom of Thailand (2004)

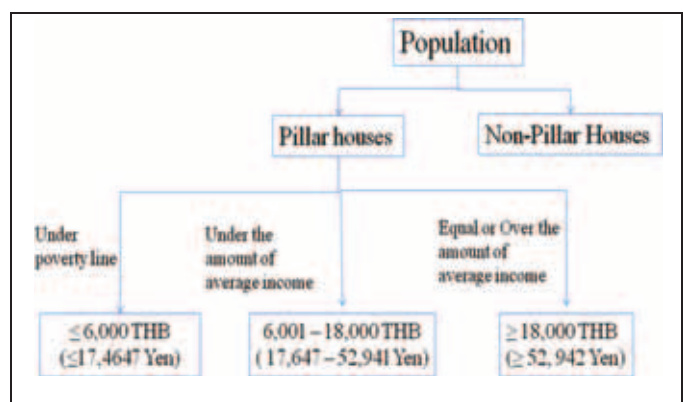


Figure 3: Stratified Random Sampling Method (THB = Baht)

Source: By Authors

Note: Household income is classified into 3 ratio based on poverty line and average income per month



## 4. Descriptive Results

They are many kinds of mitigation measures taken by local residents in the study area, which can be divided into three mitigation measures taken by residents in the study area; mitigation related house construction, preparing sandbags, boat and any staff for coping with flood, and moving any staff to a higher floor. However, many households cannot finance themselves in recovery process.

The study focuses on financial options which residents could manage their risk of loss after flood occurred. As Thailand's market risk transferring instrument in financial disaster dose not exit, six financial options of self-financial instrument mentioned in Table 1 have became the first option for affected residents. For that reason, the study is revealing financial disaster options taken by affected residents form flood.

### (1) Withdrawing upon their savings

It is important to overview the house restoration cost before the financial options taken by household. As Table 3, the results of mean difference test (T-test) indicate that an average of house restoration cost excluding furniture in 2006 have significantly difference related to type of house construction. The non-pillar house owner was force to pay for house restoration at an average of 21,000 baht (61,764 Yen). While their neighbor, who owns a pillar house, paid at an average of 8,142 baht (23,947 Yen). Noticeable, pillar house owners could handle with cost of house restoration easier than non-pillar house owners could deal with it because of lower house restoration cost.

The point was proved here that is whether affected residents can access to emergency finance as disaster relief or loan system, they still use their savings as the first reachable option for restoring their living condition and infrastructures that support them. The respondents reveal a reason of withdrawing their saving money in a previous flood because of negative change of income and added expense. They were in trouble in increased expense, while they had a sudden drop in income. It forced their consumption to rely on their savings or loan money, where they are unable to continue with their old means of livelihoods. Thereby it brings them to poverty cycle.



Source: By Authors

Table 2: Number of Respondents Shown

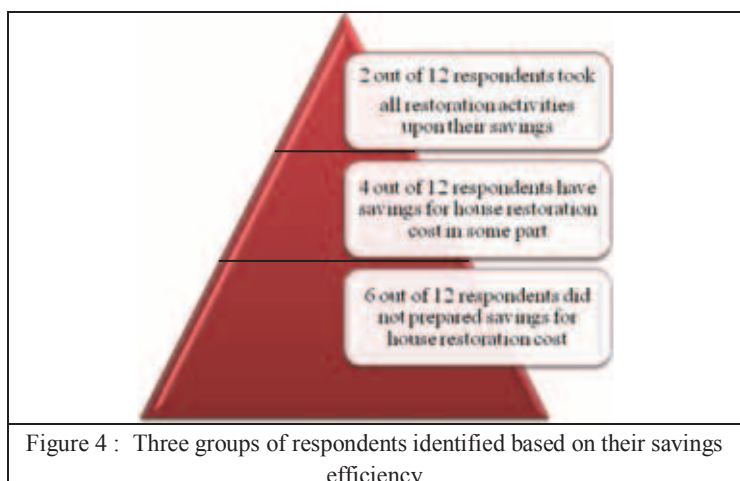
Attributes		House Construction	
		Pillar Houses	Non-Pillar Houses
Household income	≤ 6,000 Baht	3	3
	6,001 – 18,000 Baht	4	0
	≥ 18,001 Baht	0	2

Source: By Authors

Table 3 : Average House Restoration Cost in 2006

	Number of Respondents	Mean of House Restoration Cost (Baht)
Pillar House	7 (58.3%)	8,142
Non-Pillar House	5 (41.5%)	20,000

Source: By Authors



Source: By Authors

Table 4: Source of funds and its Covering Proportion Comparing with Total House Restoration Cost

		Financial instruments taken by flood victims (Average proportion of loan in each option compared with total restoration cost: Percent)		
		The respondents live under poverty line	The respondents live under average income	The respondents live over average income
Total respondents (families)		6 families	4 families	2 families
Source of Funds	Commercial Bank Loaning System	Na	Na	Na
	Saving Money	6 families (52.50%)	4 families (74.38%)	2 families (30.00%)
	Disaster Financial Assistance Contributed by Government	2 families (47.50%)	2 families (21.25%)	1 family (30.00%)
	Welfare From Employer	Na	Na	1 family (50.00%)
	Cooperative Saving Project	1 family (50.00%)	Na	Na
	Moneylenders	3 families (46.66%)	1 family (60.00%)	1 family (60.00%)

Source: By Authors

Note : (Percent) = Average proportion of loan in each option compared with total restoration cost

Na = None respondent was identified in the categories

As Table 4, financial options of low-income household are usually narrower and more climate-sensitive than those of the non-low-income. Low-income households are particularly vulnerable to deviations from average climate condition such as annual flood as their job usually rely on whether such as small shop owners and another self employment which cannot operate their shop to generate their income. Most of money spent during flooding is their saving money. Meanwhile, high-income household have more choice to mitigate their losses. They could take company welfare for financing recovery process, and they also could get income from thier employer.

Easy accessibility of financial instrument becomes a crucial factor for residents. Flood losses may be forced low-income residents borrow money from moneylenders who request 15-20 percent per month for loaning interest. We reclassified the respondents group from based on poverty line as shown in Table 4 to financial aptness base referred to their savings efficiency as illustrated in Figure 4.

As Figure 4, the results indentify that there are three groups of respondents based on their efficiency savings. The first group is respondents who did not prepare money for taking restoration activities after flood occurring. Although, All of twelve sampling prepared some money for spending in daily life during a flood, but six out of all sampling did not prepare savings for house restoration.

The mentioned six respondents took more than one financial option for satisfying their need. All of them did withdraw their savings and take at least another one financial option at the same time. Other sources of fund of this group are disaster relief, welfare from employer, cooperative saving project, and moneylenders. Unfortunately, three out of six respondents, who are low-income households living under poverty line, did not get financial support of disaster relief provided by government. Flood loss forced two of them borrowing approximately 46.66 percent of their house restoration cost from moneylenders who requested 15-20 percent of interest rate in return. The other one borrowed 50 percent of their house restoration cost from cooperative savings project for agriculturist.

The second group is respondents who prepared their own savings for spending in some part of house restoration activities. Four out of twelve is categorized to this group. All of them did withdraw their savings for covering their house restoration cost at an average of 36.25 percent of the total cost. Although, two out of four got financial support as disaster relief approximately 47.5 percent of total house restoration cost, but one out of two still needed more amount of money than supporting money provided by government. The respondent borrowed money to compensate their 40 percent of total house restoration cost shot. In fact, three on fourth respondents in this group took borrowing money from moneylender approximately 53.33 percent of total house restoration cost.

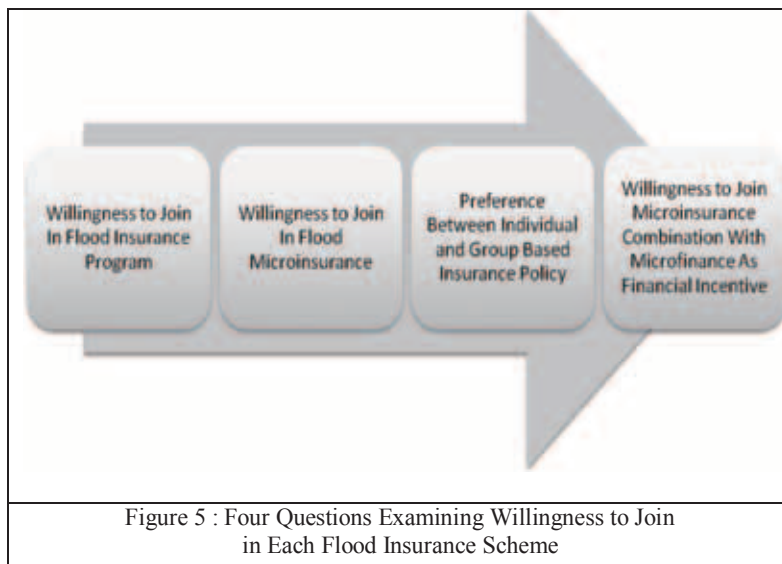
The third group is respondents who prepared their savings for taking any restoration activities, which is to recover their flood loss. There are only two respondents out of twelve respondents is identified to this group. Surprisingly, both of them are low-income household who earn income under the amount of average household income (Under 18,000 baht per mouth), and they are pillar house owner. The main reason why

low-income can handle with restoration cost is their pillar house have less costs of house restoration than non-pillar house. The respondents mentioned above could handle with total house restoration cost, which are 5,000 baht and 6,000 baht. While house restoration cost for non-pillar house construction are higher than 10,000 baht. Namely, non-pillar house owners got more financial serious problems in house restoration than pillar house owners.

Apparently, although government has been contributing disaster financial assistance for house restoration, but only four out of the respondents got the contribution. Moreover, disaster financial assistance did not cover all of restoration cost. In periods of stress, they may be forced to take another financial options in order to satisfy their needs such as loan with high interest rate, thereby it bring them to poverty cycle which of undermining the sustainability of their livelihood over the longer term.

We concerned with five out of twelve took moneylenders as major source of funds as shown in Table 4. The fact that two out of five are living upper poverty line and one of them is medium income household. The results stated that 50 percent of low-income households did borrow money from moneylenders trading with 15-20 percent per month of interest rate in return. This statement can refer that informal loaning system has been gotten popularity among low-income residents and medium-income residents.

## (2) Willingness to mitigate flood loss through Flood Microinsurance Program



Source: By Authors

The study introduced microinsurance scheme as a new financial option to the sampling for examining their needs, their attitude and their willingness to join in flood microinsurance program. The 12 respondents were asked about what extent they would like to join in optional insurance scenario. Four questions of optional insurance scenario are related to benefit-limitation of insurance in each insurance scheme. As Figure 5, the intensive degree of questions were started with willingness to join in flood insurance program, willingness to join in flood microinsurance, preference between Individual group based insurance policy, and willingness to join in microinsurance combination with microfinance as financial incentive.

The first question asked about respondents' willingness to join in flood insurance program using premiums based on fire insurance policy of American International Insurance Company (AIA). Based on the question, the question the requested premium is started with annual cost at 4,834 baht per year for trading with 1.5 million baht of coverage loss<sup>11</sup>. The results found that none out of twelve respondents is willing to join in flood insurance policy. It is not surprising that the respondents would prefer to be non-insured over to be clients of insurance company as the premium cost is over 25 percent of their household's monthly income.

The second question had provided information and advantage of flood microinsurance, neighborhood flood microinsurance comparing with traditional insurance before asked the questions of willingness to join in flood microinsurance. The provided information is shown as follow; firstly, microinsurance has escalator-type of premium for keeping initial affordable premium for low-income households, which it is lower premiums than traditional insurance. Secondly, frequent and irregular payment is adapted to clients' financial liquidity. The results indicate that eight out of twelve respondents are willing to participate in microinsurance policy. The result of in-depth interview reveals that sensitiveness in price and financial self-control problems are the crucial factors dominating their willingness. Furthermore, the numbers of independent member in family is determinant of willingness to join in microinsurance policy. However, there is not significantly correlation between number of total family's member and willingness to join in microinsurance policy. In short, the residents who reside in large family with many independent members tend to be more willing to join in microinsurance than other groups. The study proves that income and house restoration cost are need

of respondents to mitigate their loss through microinsurance. Ten out of twelve respondents reflect that they want to get indemnity in house restoration cost, and two of them are willing to get compensation for diminished monthly income as same as other two of all respondents expect from microinsurance.

The third question is asking about would respondents prefer neighborhood (group) flood microinsurance policy coming with the lowest premium cost scheme, or higher premiums of individual flood microinsurance. According to the survey, 58.3 percent or seven out of twelve respondents would prefer individual insurance scheme rather than group insurance scheme; though more than half (57.14 percent) of those have daily talking and sharing risk information to their neighbors. To take preference of group insurance scheme into account, the study investigates the crucial factor influencing on willingness to join in group insurance scheme by correlation test. The surprising results of daily talking and sharing risk information among neighbors have significantly less leverage to persuade respondents to join in group insurance scheme. However, the crucial factor dominating preference of respondents in group insurance scheme is power of exchanging things and contribution among their neighbors, which can dominate respondents' preference in group insurance scheme. Namely, respondent who often contribute to or got contribution from their neighbors tend to prefer group insurance scheme than non-contributor group.

The last question aims to convince four out of twelve respondents, who are not willing to join in microinsurance policy, to turn them in microinsurance policy. As the consequent of answer, the study set a hypothesis that financial incentives is one factor dominating willingness to join in microinsurance policy, financial incentives in term of microfinance (such as micro-credit and micro-saving) are offered to respondents for examining domination of financial incentives on willingness to join in microinsurance policy. As the survey, two of those respondents would be more willing to join in microinsurance policy, if it is microinsurance combination with microfinance. Moreover, the question was asked to eight out of twelve respondents who are willing to participate in microinsurance policy. Seven out of eight admitted financial incentives are one factor persuade them into participating in microinsurance policy.

The results can refer that respondents need to ensure in flood risk through participating in microinsurance policy as well as they need saving and loan system as basic financial need in the first priority. Thus, microinsurance combination with microfinance is presumably preferable financial instrument, which respondents would like to join in it.

## 6. Conclusions

After flood occurring, affected household have to restore their lives and infrastructure that support them. Not only well-off exposure asset holders are in trouble, but also low-income households owning small properties are suffering in limited financial capacity for recovering themselves. However, attention in risk financing approaches has been increasing into account of microinsurance as a new market risk-transferring instrument coming with affordable premium, which can increase financial security of low-income residents to against residual flood risks. The furthermore crucial point is how to enable Thais low-income residents as well as other income class to mitigate their flood risk through flood microinsurance. Unfortunately, flood microinsurance and flood insurance are not available, and has never researched in Thailand. Thus, the study focuses on what do low-income residents need to mitigate flood loss thought microinsurance if it would exist.

In conclusion, the results of the study indicate that compensation for diminished monthly income and indemnity for house restoration cost are the things that respondents need. As respondents have character of low-income residents who are self-employment, they are more climate sensitive than another employee who works in organization or company. Thereby, flood cause them become victim of income insecurity and underemployment. Clearly, the results indicated that eight out of twelve respondents would like to get compensation for diminished monthly income. Meanwhile, house restoration cost will become a problem of residents if flood occurs. As the results, although all respondents have some savings for spending in time of disaster, but only two out of them could completely handle with cost of restoration activities. In time of financial liquidity strain, many residents needed other financial options to support their house restoration cost. Easy accessibility of financial instrument became a crucial factor for residents. Five out of twelve respondents admitted that they borrowed money from moneylenders trading with 15-20 percent per month for loaning interest in retune.

As a final point, microinsurance can play in indemnitor role to compensate flood loss instead of allow low-income residents make a loan transaction with moneylenders. Five questions of interview model were established to identify respondents' attitude and their willingness to join in microinsurance. As the results,



the tendency of preference in group insurance scheme of neighborhood flood microinsurance rather than individual insurance scheme is depended on neighborhood relationships in term of exchanging and contribution things among the neighbors. Meanwhile, respondents need to mitigate flood risk through microinsurance policy as well as they need saving and loan system in basic financial need. Thus, microinsurance combination with microfinance is probably an incentive to persuade residents participating in microinsurance policy, while enhancing neighborhood relationships in terms of exchanging things and contribution among the residents are the fundamental way to achieve the ultimate goals of neighborhood flood microinsurance.

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